



CASE STUDY SUMMARY

The building automation system was enhanced to allow centralized, precise control of large loads, resulting in energy savings and increased occupant comfort.

- Participant:
County of Alameda
(five sites)
- Building Type:
Institutional, multi-site
- Site Size:
2 million ft² / 10,100
occupants
- Project Cost:
\$280,000
- Project Incentives:
\$260,000
- Primary Benefit:
1.4 MW curtailable
demand

Alameda County can curtail 1.4 MW of load within minutes through enhanced automation.

In anticipation of electricity shortages during the summer of 2001, the County of Alameda installed integrated HVAC metering and control technologies in several facilities, including its main courthouse. County personnel can now incrementally power down the chillers in the courthouse, as well as four other County buildings, through any single computer with an Internet connection and standard Web browser. This allows the County to efficiently curtail energy use while maintaining occupant comfort.

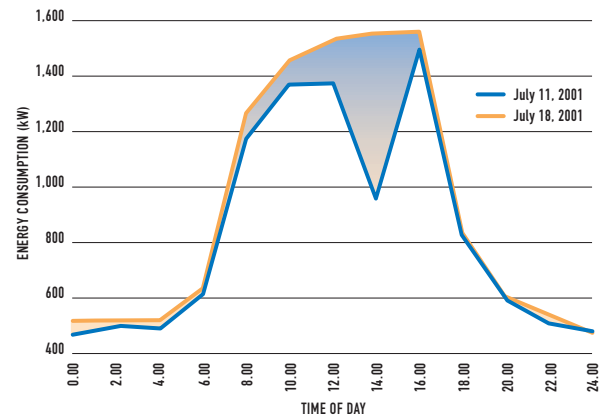
- Unpredictable energy supply
- Inability to curtail energy use and still maintain occupant comfort
- Rising energy costs

PROBLEM

As the summer of 2001 approached, the County of Alameda was concerned about rising energy prices, anticipated energy shortages, and the threat of blackouts. Between fiscal years 2000 and 2001, the County's overall annual energy costs increased approximately 25 percent. Also, all of the County's non-exempt facilities were hit with a rolling blackout during January or March of 2001.

Because the County was already utilizing lighting efficiency measures, the HVAC system was targeted—specifically, the two Trane 400-ton centrifugal chillers in the County's main courthouse. Prior to the retrofit, the County's existing building automation system (BAS) afforded the building operator little flexibility in controlling these large loads. This not only made it difficult for the County to curtail energy use, but also to maintain occupant comfort.

County of Alameda Courthouse Electrical Demand



This graph compares the courthouse's electrical demand (kW) for July 11, 2001 and July 18, 2001. The data for July 11th reveals a significant drop in kW between 1 P.M. and 4 P.M., during which time the chiller load had been curtailed. The shaded area highlights the 500 kW difference in demand between July 11th and a baseline day on which no curtailment occurred.

- More precise control of large loads
- Centralized control of multiple decentralized HVAC systems

SOLUTION

To make their BAS more flexible in the face of energy shortages and to “do their part” to mitigate the chance of rolling blackouts, the County upgraded the existing BAS in five of their largest facilities using CMS Viron's Curtailment Vision™, an Internet-based load curtailment program. The upgrades, funded mostly through the California Energy Commission, involved (1) enabling the County to set controls to incrementally power down its chillers, and (2) connecting the affected facilities' utility meters to the Internet so that the effect of the chiller load reductions on facility-wide loads could be verified in near-real time from any computer with an Internet connection and standard Web browser.

“Curtailment Vision and our upgraded building automation system make us feel more prepared for whatever may come in terms of real-time pricing schemes.”

“More precise control over our chiller settings has allowed us to save energy, while increasing occupant comfort.”

Matt Muniz
Energy Program Manager
County of Alameda



“Our enhanced system has given us access to real-time electrical use data, which has been tremendously useful for monitoring and optimizing the running of our facilities.”

- Real time data collection that allows for energy use monitoring
- More flexible curtailment options
- Less vulnerable to volatile energy markets
- Lower energy costs

BENEFITS

The County now has the ability, through a single Web site, to shed a total of about 1.4 MW of load within minutes in the event of an emergency. This ability not only helps bolster the reliability of the region's electrical system, but also makes the County eligible to receive state incentives for curtailing load when blackouts are imminent. More precise control over the chiller settings also allows the County to use less energy, while maintaining occupant comfort.

Interestingly, the primary benefit that the County realized as a result of installing the new enhanced automation system was one that they had not anticipated. Through a password-protected Web site, the new system provides the County continual, remote access to 15-minute energy use information for the facilities that received upgrades. According to Matt Muniz, the County's Energy Program Manager, access to this data has been "tremendously useful" for verifying that actual building loads reflect intended use.

The County is also well positioned to take advantage of real-time pricing should it arrive. Many of the County facilities operate on a 9-5 schedule and, therefore, use energy during the daytime peak when it is most expensive. Their new control system allows the County to respond quickly and effectively to increases in the retail price of electricity.

PROJECT SITE DESCRIPTION

- Location:
County of Alameda
- Size:
Five County buildings occupying 2 million ft²
- Space Function:
Law enforcement
- Number of Occupants:
10,100
- Site Contact:
Matt Muniz
Energy Program Manager

Energy Usage

- Average Annual Peak Demand:
6.8 MW
- Curtailable Demand:
1.4 MW

Equipment Installed

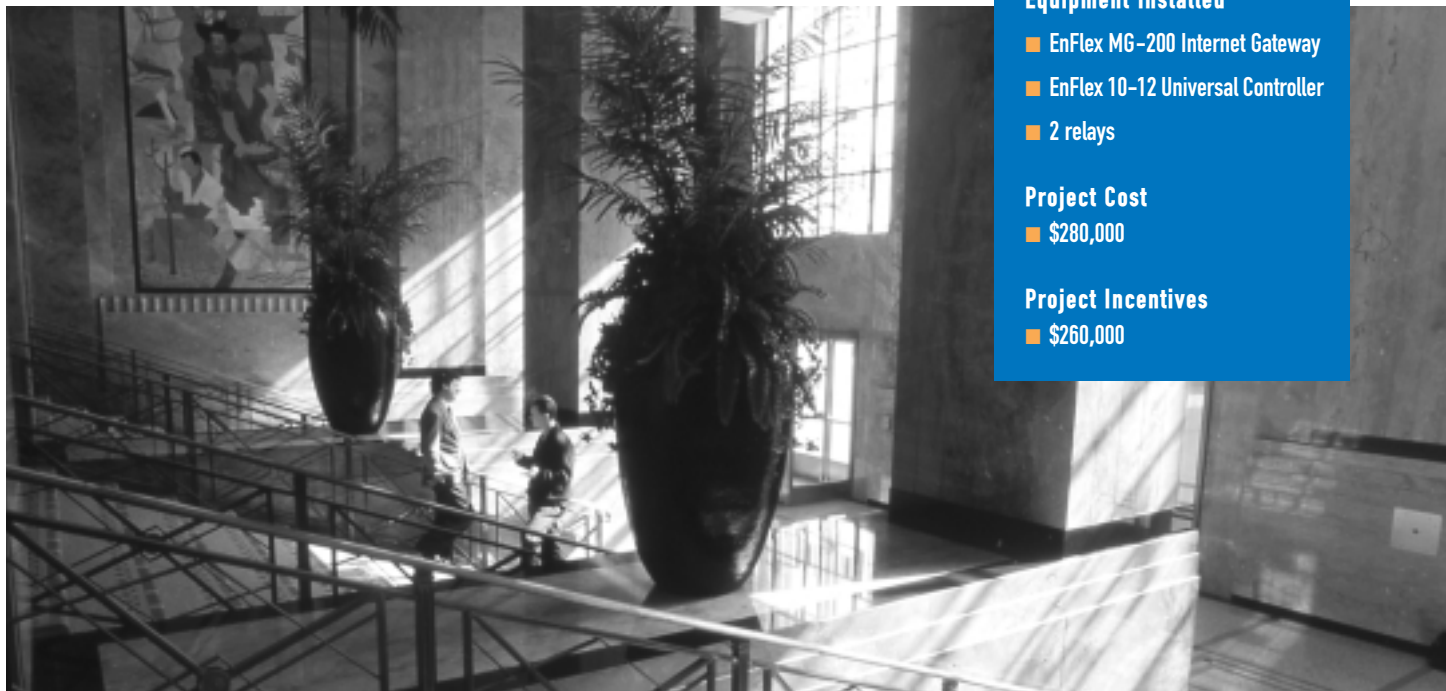
- EnFlex MG-200 Internet Gateway
- EnFlex 10-12 Universal Controller
- 2 relays

Project Cost

- \$280,000

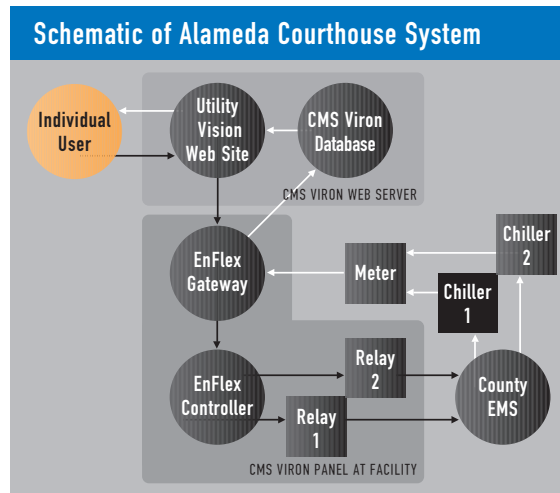
Project Incentives

- \$260,000



Technical Information

In 2001, CMS Viron proposed to the County of Alameda the installation of Curtailment Vision, an Internet-based load curtailment program that is part of CMS Viron's Utility Vision services. CMS Viron did a quick engineering study of what the load reduction potential was at several County facilities and wrote a successful application on behalf of the County for a grant from the California Energy Commission.



The County applied the grant monies to five of its largest facilities, at which CMS Viron installed the following components: an EnFlex MG-200 Internet Gateway, an EnFlex IO-12 Universal Controller, and two relays. The EnFlex Gateway is a gateway between the Internet and the County's local area network (LAN) through which curtailment signals are received from the Web and through which metered data from the facility is sent to the Web. The EnFlex Controller supplements the capabilities of the EnFlex Gateway. When a curtailment signal is sent from the Web, it goes through the Gateway to the Controller and to a relay.

To curtail load, the County logs onto the Utility Vision Web site (www.utilityvision.com), which is hosted on a server at CMS Viron's headquarters. At the Web site, a user can, with a few clicks of a mouse, initiate curtailments of any degree at any or all of the five facilities, for any length of time. When the user confirms the curtailment, CMS Viron's server sends the curtailment commands over the Internet via FTP to the targeted facilities. At a targeted facility, the commands are received by the EnFlex Gateway and sent to the EnFlex Controller, which will, depending on the command, close either relay 1 or relay 2. When a relay is closed, a digital signal is sent to the County's local TAC America (CSI, or Control Systems International, at the time of the project) energy management system. The TAC system, in turn, sends a signal to the chiller plant to power down to the appropriate level.

Additionally, in four of these five facilities, PG&E installed a pulse initiator on the electrical meter. The pulse initiator is wired directly to the EnFlex Gateway. The pulse initiator sends 15-minute kW data from the meter in the form of digital signals to the EnFlex Gateway, which, in turn, sends the data out to the Internet and to a database located on CMS Viron's Web server. From the password-protected Utility Vision Web site, County personnel may access and view each facility's instantaneous demand as well as historical demand data.

TAKING THE NEXT STEP

Free resources are available from the California Energy Commission.

- Business Case Guidebook
- Technical Options Guidebook
- Contractor and Vendor Lists
- Technical Assistance
- Case Studies

- 2 Hewlett-Packard Company
HVAC and Lighting Controls/
Office Campus
- 3 Comerica Building
HVAC and Lighting Controls/
Large Office Building
- 4 Foothill-De Anza
Community Colleges
HVAC and Lighting Controls/
College Campuses
- 5 Staples, Inc.
HVAC and Lighting Controls/
Retail Chain
- 6 Doubletree Hotel
HVAC and Lighting Controls/
Hotel and Convention Center

Contact us for free materials or for further information:

- 1-866-732-5591
- enhancedautomation@xenergy.com
- www.energy.ca.gov/enhancedautomation

Additional Resources

- California Energy Commission
www.energy.ca.gov/peakload/index.html
- Cash for Kilowatts Web site
www.energy.ca.gov/peakload/cash_kilowatts.html
(also for 50-200 kW demand)
- Your local utility
 - www.sdge.com/business/drpf.html
 - www.pge.com/003_save_energy/003b_bus/index.shtml
 - www.sce.com/sc3/002_save_energy/002i_load_redn/default.htm